

15 November 1958

**MEMORANDUM FOR: Dr. James R. Killian**

An advisory group composed of the undersigned, together with the Assistant Secretaries for Research & Development of the Air Force and the Navy, have considered over the past several months the technical features which must be achieved in order to provide an adequate successor to the presently operational special reconnaissance aircraft. These features are:

Substantial increase in operational ceiling and probably also in speed to avoid interception;

Low susceptibility to detection by radar and other modes of observation;

No sacrifice in operational range;

Minimum size and weight.

The group has evaluated a number of proposed special reconnaissance aircraft concepts. These various concepts have included the use of unique engines, special fuels, launching by rocketry or mother aircraft, new structural materials and design methods, unusual design configurations and other features. The advisory group has had access, it is understood, to all design proposals that have been made to the Military Services that might be of interest in the reconnaissance application and have considered the technical characteristics of certain aircraft now under military development.

It is our conclusion that the most satisfactory design approach is one based upon a new, small and reasonably lightweight aircraft carried aloft to supersonic speed by the B-58 as a mother aircraft. The special reconnaissance aircraft would cruise by itself at substantially higher altitudes but over the same distances as now achieved and would be powered by dual ram-jet engines using conventional fuel. By reason of its high supersonic speed, cruise altitude, and design features, this aircraft would be much less susceptible to radar detection and tracking than current aircraft. There appear to be no unusually difficult problems in terms of facilities or techniques in the development of this aircraft and its engines except perhaps those of aerodynamic heating and of achieving satisfactory ram recovery with a complex air inlet to buried engines.

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A second and technically somewhat less desirable choice is a similarly small and reasonably lightweight aircraft capable of unassisted take-off, flight at the same high altitudes but at slightly less supersonic speed, and over about three-fourths the desired range when using conventional fuels. This alternate design would be powered by twin ram-jets quite similar to the preceding case in addition to a pair of currently developmental small turbo-jets adapted to supersonic speed. This alternate design could achieve full range by either refueling at supersonic speed or by use of special fuels suspected of posing certain operational problems. This alternate design would be more susceptible to detection and tracking by radar. The development of the alternate aircraft would pose somewhat less of a problem in aerodynamic heating but the flight performance is predicated on extremely close control of all weights including somewhat reduced payload. While this alternate design may be available sooner than the other, the ram-jet development could be a governing factor in either case.

We recommend that the development of a new aircraft be undertaken at once on a highly expedited and sensitive basis in order to retain our ability to conduct special reconnaissance. We recommend further that the former proposal utilizing the B-58 to launch a newly designed reconnaissance vehicle be selected for this purpose since this aircraft appears to best meet all of the desired technical features. Although a more detailed comparison may reveal that the latter proposal could be developed at somewhat less cost, this unstaged system does not appear able to meet all of the desired technical features with the same success. In case the system we recommend is not acceptable, we would wish to review other alternatives before recommending firmly a second choice.

/s/ Edwin H. Land  
Edwin H. Land, Chairman

/s/ Courtland D. Perkins  
Courtland D. Perkins

/s/ Edward M. Purcell  
Edward M. Purcell

/s/ Allen F. Donovan  
Allen F. Donovan

/s/ H. Gayford Stever  
H. Gayford Stever

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